

Cold-wave warnings were issued for Oklahoma, 8:30 p. m. of the 22d, and repeated and extended to extreme northwestern Arkansas at 9 a. m. of the 23d, and were extended at 3 p. m. over Arkansas and the interior of Texas, and were repeated at 8:30 p. m. for Arkansas and Dallas and Palestine, Tex.; the warning was extended at 9 a. m. of the 24th to the coast; these warnings were generally justified.

Frost or freezing warnings were issued for portions of the southern part of the district on the 4th, 5th, 8th, 9th, 10th, 17th, 25th, and 31st. Fire-weather warnings were issued on the 3d, 19th, and 23d.—*I. M. Cline.*

DENVER FORECAST DISTRICT.

With the exception of a storm which appeared over Idaho on the afternoon of the 1st and moved rapidly southeastward across the district, the first half of the month was characterized by settled weather, under the influence of high pressure in the Plateau region. During the latter part of the month low pressure and unsettled weather prevailed west of the mountains, while a succession of cold anticyclonic areas occupied the northeastern slope.

The storm which appeared over Idaho on the afternoon of the 1st moved rapidly southeastward, overspreading both slopes of the Rocky Mountains by 8 a. m. of the 2d, with barometer readings more than 0.5 inch below the normal. The disturbance was followed by an unusually sharp rise in pressure in the North Pacific States. Warnings of a moderate cold wave were issued for Utah, northern and western Colorado, northern Arizona, and northwest New Mexico on the 2d. The temperature fell 10° to 16° in the greater part of Colorado and New Mexico and was well below the freezing point. The coldest weather following the storm did not occur, however, until the morning of the 4th, when the readings in the greater part of the area for which warnings were issued ranged from 2° to 14° above zero. An area of low barometer developed in the northern Rocky Mountain region on the 15th, being central at 8 p. m. in northeastern Colorado. Cold-wave warnings were issued for eastern Colorado. The warnings were justified, the prevailing temperatures ranging from zero to 14° above zero on the morning of the 17th. A cold wave also occurred in northeastern Arizona, extreme southwestern Colorado, and parts of New Mexico.

Another area of low pressure of considerable intensity appeared over Nevada on the 18th, with an area of high pressure over Alberta. Cold-wave and live-stock warnings were issued for eastern Colorado and extreme eastern New Mexico. Although the anticyclonic area moved very slowly southward and eastward, the western disturbance remained central on the Pacific coast, having apparently recurved to the northeastward before reaching the coast. While the falls in temperature were not great, colder weather prevailed in eastern Colorado, with temperatures ranging from 5° to 20° above zero on the mornings of the 19th and 20th. Unsettled weather, with local rain or snow, prevailed in Utah, western Colorado, and northern Arizona from the 18th to the 23d under the influence of this disturbance. On the evening of the 22d another cold anticyclonic area was overspreading the northeastern slope, while the western disturbance had apparently concentrated as a deep center of depression in southwestern Utah. Warnings of a cold wave were distributed for Utah, Colorado, northern Arizona, and northern and eastern New Mexico, and

heavy snow for Utah, Colorado, northeastern Arizona, and northern New Mexico. Heavy snow occurred in parts of Utah and Colorado and a cold wave in the greater part of the area for which warnings were issued. Zero temperature was reported on the morning of the 24th at Flagstaff, and the temperature was 6° to 8° below zero in northeastern Colorado. A cold-wave warning issued for southeastern and extreme eastern New Mexico on the morning of the 24th was followed by a sharp fall in temperature with readings close to 20° above zero in southeastern New Mexico. Heavy snowfall warnings were issued for Utah and northern Arizona on the morning of the 25th, an area of unusually low pressure having appeared on the middle Pacific coast. The disturbance decreased in intensity, however, and failed to move inland. Moderate to heavy precipitation was confined to western and central Arizona.—*Frederick W. Brist.*

SAN FRANCISCO FORECAST DISTRICT.

The pressure distribution controlling the weather over the Pacific Slope during December, 1921, was of two entirely different types, and each covered practically one-half of the month. During the first portion of the month the pressure was low over Alaska, the British possessions and the north Pacific Ocean and high over the southern Plateau, California, and the ocean to the west and storms from the north Pacific entered the continent at a high latitude. This is the typical distribution for fair weather in California and the Plateau, light rain in western Oregon and seasonable rain in Washington.

The latter part of the month presented a complete reversal of the pressure distribution. A large sluggish area of high pressure covered Alaska, the British possessions, North Pacific Ocean, and Rocky Mountain region, and caused storms from the ocean to be forced far south of their usual path and enter the continent through California. This is the typical condition for heavy precipitation over California and the Plateau. Hence, the first part of the month gave moderate precipitation in western Washington and northwestern Oregon, and the latter part heavy precipitation in California and the Plateau region.

The storm from the 18th to the 27th did a large amount of damage to highways, bridges, and railroads in southern California by floods, washouts, and landslides. The gale on the 25th in the San Francisco Bay section prostrated telegraph and telephone lines, uprooted many trees, unroofed several houses, and interfered with the ferry services on the bay. On the 20th, while about 900 miles off the California coast en route to Honolulu, the Japanese freighter, *Texas Maru*, was severely damaged by gales and high seas and the first and third officers were washed overboard.

Storm warnings were ordered 15 times, small craft 2, and advisory warnings 4. Frost warnings were issued in California 9 times and a cold-wave warning in eastern Washington and northern Idaho on the 18th.—*G. H. Willson.*

627.41(73) RIVERS AND FLOODS.

By H. C. FRANKENFIELD, Meteorologist.

Mention of the Ohio River flood of late November and early December was made in the MONTHLY WEATHER REVIEW for November, but no data were given for points south of Mount Vernon, Ind.